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AIR OPERATIONS IN CENTRAL AMERICA

INTRODUCTION

This study was initiated to determine the feasibility of carrying out air operations at low levels in the Central American area during the period April through July. An attempt has been made to determine the diurnal variation of the various weather elements to find if there is a time of day best suited for air operations.

A list of stations where terminal weather conditions were desired was supplied by the requestor. However, summaries of hourly weather observations were available to this office for only two of these stations, Guatemala City, Guatemala and San Jose, Guatemala. Summaries of monthly temperatures, precipitation, and surface winds were available for two additional stations, Chimax and Quezaltenango. Tables giving the total monthly precipitation and days with precipitation were available for all the remaining locations with one exception.

DISCUSSION

It is believed that the lack of detailed reports of all the weather elements for all the locations does not detract greatly from the utility of this report. The attached tables of average conditions at Guatemala City should be representative of the worst conditions encountered on the average in this relatively small area.

Weather conditions in the Central American region are generally no more hazardous for low level air operations during the period April through July

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than in the Southeastern United States or the Mountain States during summer. Over the open water and the flat coastal plains, conditions are even slightly better on the average except for the more frequent occurrence in this area of heavy rainfall which will restrict visibility. However, heavy rainfall seldom restricts visibilities to less than one mile. This is true even in the mountainous areas where rainfall is most intense. For example, at Guatemala City only two observations out of a total of 9,684 were listed when the visibility was limited only by heavy rainfall to less than one mile.

The main hazards to flying operations in the Central American area during this period are tropical storms and frequent thunderstorms.

Tropical storms are those widespread storms which have intense rainfall and strong surface winds. They include hurricanes which are distinguished from the former only by their stronger winds. These tropical storms are very unlikely to occur anywhere in this area before June. Tropical storms from the Caribbean Ocean have been observed to pass over northern Guatemala only three times in twenty years. Of these three one was observed in June. Tropical storms in the Pacific have never been observed passing over Guatemala during the same twenty year period. However, it should be noted that they will cause much more intense precipitation and stronger surface winds than normal at distances of from 200 to 400 miles from their centers.

Thunderstorms are the most frequently observed hazard in this area. They are quite frequent only during the rainy season which normally begins in Guatemala in early May. The fact that these rainy season thunderstorms cannot be accurately forecast when they are due to local conditions probably makes them the most hazardous phenomena. However, they are probably not as turbulent as the summertime thunderstorms of middle latitudes, except

immediately over high mountain peaks. This is borne out by the lack of reports of hail or very strong surface winds at both Guatemala City and San Jose. At these land stations, thunderstorms are most frequent during the late afternoon and early evening. At stations very near the coasts, such as San Jose and Puerto Barrios they may be nearly as frequent during the night since they will be blown in from the sea. All stations experience them least frequently during the late morning hours.

The rainy season normally begins during the first half of May in Guatemala. During most years the frequency and intensity of precipitation have reached a maximum during June and have decreased slightly in July. During all these months rain occurs most frequently from the middle of the afternoon through the early morning. Since there is a close association between the occurrence of rain and that of low cloudiness, this fact is quite important in scheduling the hours of air operations.

Most of the fog which forms is in the form of ground fog except around mountain peaks where it is actually low cloud. Fog has had its maximum occurrence during April and has been much more infrequent during the other months. There was a very marked daily variation in the occurrence of fog at both Guatemala City and San Jose, since its occurrence was confined almost exclusively to the hours from 0200 to 0900 local time.

Restricted visibilities are also caused by rain, as discussed above, and smoke. Smoke is almost exclusively a dry season phenomena and is due to the burning of dry grass cover by the natives. It has its maximum occurrence in April and early May. However, smoke normally restricts visibility to between three and six miles and very rarely to less than one mile. At Guatemala City smoke caused visibility to be less than one mile only once during these four

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months. Smoke has its greatest incidence during the late morning and early afternoon. Because the three causes of restricted visibilities have a greater frequency of occurrence at different hours of the day, there is little hourly variation in visibilities less than six miles during April and May. However, there is a marked diurnal variation during these two months of visibilities less than three miles with its incidence being much less between 1000 and 1800 local time.

The average surface winds are quite light at all these stations. The maximum wind speed at the three stations for which these figures were available was forty miles per hour at San Jose. The surface winds are strongest on the average at the coastal stations where the sea breeze effect is well developed.

At the inland station's the wind is lighter and those in protected valleys, such as Quetzaltenango where the highest wind reported between April 1946 and July 1946 was only 10 1/2 miles per hour, are quite light.

Data of the hourly winds were not available. However, some statements on the diurnal variation of the surface wind can be made. San Jose and Puerto Barrios will experience a marked sea breeze effect during April and May. This will cause the winds to blow from the sea onto land during the late morning and afternoon and to reach their maximum speed during the late afternoon. After sunset the winds will become lighter and finally some time after 2200 the land breeze will begin to blow and continue to shortly after sunrise. This land breeze is normally not nearly so strong as the daytime on-shore wind. During June and July the winds are lighter and usually more variable at these coastal stations. Inland the land and sea breeze is not so well developed and terrain exerts the greater effect on the winds so that no statements on their diurnal variation are possible.

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CONCLUSIONS

Considering all the weather factors, low level air operations are feasible during all four of these months. When all the factors are considered, April and early May are probably the best months to conduct these operations. Because of the diurnal variation in visibilities less than three miles, the best hours for air operations during these two months are between 1000 and 1800 local time.

Because of the increase in the number of days with rain during June and July with the accompanying increase in low clouds which will often obscure mountain peaks and sometimes close the passes between the mountains, flight operations are somewhat more hazardous than during the previous two months, although still feasible on the majority of the days. The best hours during these months are between 0900 and 1300 local time.